

3.15-31 the EIR/S mentions that construction of wildlife underpasses, bridges, and/or large culverts, could be considered to facilitate known provide these wildlife movement corridors. The EIR/S should provide evidence for the success of this type of mitigation in a wetland environment like the GEA and provide more detail on the number and location of such structures to facilitate wildlife movement across the railroad right-of-way.

The EIR/S incorrectly limits the zone of impact to 0.25 miles away on either side of the tracks in rural areas and 0.5 miles away in sensitive areas (p. 3.15-4). In reality, large mammalian species such as San Joaquin kit fox, elk and bobcat have individual territories that may cover tens or hundreds of miles. So while an animal will only be impacted if it comes in contact with the train corridor, in a population sense the zone of impact is much larger since it encompasses the entire habitat of the animals which are killed or otherwise impacted by the train.

IV. Induced Growth Effects of the HST on the GEA Must be Fully and Correctly Assessed in the EIR/S

The Draft EIR/S stated "For Merced County, analysis results suggest that about 88 percent of population and employment growth experienced with the HST Alternative would have occurred anyway under the No-Project Alternative". (P. 4-23 of the Cambridge Systematics Economic Growth Effects report). I believe this is an underestimate of the growth inducing effects of the proposed project, and their impacts on the wetlands complex, for several reasons:

1. Induced growth is related to the station at Los Banos and commute trips to Bay Area and Sacramento. If the existence of the train line effectively shortens commute times between the Merced County area and the urban employment centers in the San Francisco Bay Area and the Sacramento area then more people will perceive of these areas as a bedroom community option, especially if the cost of housing there is substantially lower than closer in to the big cities, as it has been historically. The effect can be greater than assumed in the EIR/S – in other words, the assumption that only 12% more growth will result from the HST alternative than from the No Project Alternative is probably false.
2. As stated above, the EIR/S assumption was that impacts were limited to a zone 1/4 mile on either side of tracks or the station in rural areas and .5 miles on either side in sensitive areas. This is not a valid assumption. Induced growth can take place virtually anywhere in Merced County and is not related to the corridor around the train tracks, although it is likely to occur near the train station location.

The EIR provides no information to analyze the likely future pattern of growth. It is a numerical, tabular population analysis rather than a map-based analysis. There is no way to independently determine where the excess growth will go.

In the absence of strict land use controls by the local cities and the County, developers will build housing throughout the greater Los Banos area including in areas east of the Santa Fe Grade that will degrade the value of the wetlands. People will be willing to buy housing throughout this area and will not consider a local commute between Santa Nella where the proposed train station is, and their home housing tracts to be onerous, since it will be a short commute compared to the long-distance commute afforded by the train.

3. Impacts of urban encroachment on the wetlands complex of the GEA have been documented in numerous studies including the 1995 Land Planning and Guidance Study (for example the supporting study by Reed F. Noss, "Translating Conservation Principles to Landscape Design for the Grassland Water District"). Impacts include fragmentation of the North Grasslands from the South Grasslands and a reduction in habitat value of the entire interior of the wetlands complex.
4. The "Los Banos" station is shown as being in the vicinity of Santa Nella, a rural center about 6 miles north of Los Banos that is adjacent to the Los Banos wildlife area. The sprawl growth that will occur around this station will have detrimental effects on this wildlife area. Adverse effects of urban development near wetlands that were reported by Reed Noss in his supporting study to the 1995 *Land Planning Guidance Study* include:

Edge effects where predators, competitors and parasites of sensitive wildlife species may thrive in the disturbed habitat in and adjacent to various types of urban development. Noss reported that remnant wetlands are especially susceptible to exotic species invasion in fragmented landscapes. For example, crows and ravens are highly destructive predators on bird eggs and small mammals. These birds have become serious pests in many areas since their populations have surged in response to the huge amount of food in solid waste in urban areas, as well as agricultural waste at dairies and feedlots. Deleterious edge effects commonly extend 50 to 200 meters into a habitat from an edge, and in some cases much farther.

Impacts of urban development adjacent to wetlands include (1) physical disruption, such as mowing and digging (2) chemical disruption including the introduction of fertilizers and toxic chemicals in drainage water (3) introduction of non-native species of both plants and animals (4) noise disruption and (5) visual disruption caused by removal of trees and shrubs around the wetlands.

Another key impact of urban development is the interruption of water deliveries for wildlife uses and the competition for the water supply that supports the wetland habitat.

In fact, a station anywhere in the vicinity of Los Banos will contribute incrementally to excessive and sprawl growth in the Los Banos area that will impact the GEA, as described below.

Conflict of Urban Growth and Buffer to Protect the Wetlands

The 1995 *Land Planning Guidance Study* prepared for the Grassland Water District recommended a buffer zone of 2 miles around the entire perimeter of the GEA to protect the interior from the effects of urban encroachment. The train corridor within the GEA habitat areas, and the induced development that is likely to occur closer than two miles from the boundary of the GEA will degrade the quality of the habitat in the wildlife refuge.

The 2001 *Land Use and Economic Study* published by the Grassland Water District contains information relevant to the issue of encroachment of urban development on the 2-mile wide buffer zone that was recommended to protect the interior of the wetlands complex. Only

land uses compatible with wildlife uses, such as agriculture, were recommended to occur inside the buffer zone.

According to the 2001 study, if growth occurs according to the sprawl growth scenario, which is the conventional mode of growth in California, the added population of 421,934 by the year 2040 will require a total of 94,127 new acres of urbanized land. The intersection of the growth zone around cities with the two-mile band around the GEA (and in the case of Los Banos, the GEA interior as well), corresponds to a potential "zone of conflict". Within the 160,000-acre area that corresponds to a two-mile band around the GEA, the present 2187 acres of urban land (1.4% of total area) could grow to as much as 16,400 acres (10% urban) under the low-density "sprawl" scenario. Correspondingly, of the 167,600 acres that form a two-mile ring around the six cities, the percentage of land that is urban is expected to grow from the present 7% up to as much as 45% (from 12,341 to 75,973 acres) under the low-density sprawl scenario.

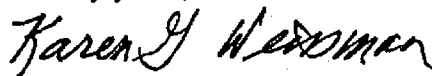
Of the six cities in Merced County, Los Banos, Gustine and Dos Palos have city spheres that include a portion of the two-mile GEA band. Growth in unincorporated areas such as Volta or Santa Nella could also have adverse consequences on the wildlife refuge areas. Los Banos presents the greatest problem with lands within both its current city boundary and its sphere that are either directly within the GEA area or its two-mile band. The current Los Banos General Plan prohibits growth east of the Santa Fe Grade and discourages non-compatible uses east of the San Luis Canal, both of which are intended to slow down encroachment on the nearby wetlands complex. However, the policy protection afforded by General Plans is far from permanent as General Plans are re-written on a 5 or 10-year cycle.

In summary, the Draft EIR/S failed to mention the identity or the special values of the GEA or GWD, or to discuss their importance as a wetland and wildlife resource of local, regional and national scale importance. As a result of this omission, the Draft EIR/S also failed to address the construction, operations and induced growth impacts on the proposed high-speed rail project on this highly valuable and vulnerable resource area. The Draft EIR/S must be greatly expanded and re-circulated to include all of these issues.

The DEIR/S failure to acknowledge the values and unique importance of the Grassland Ecological Area has artificially raised the attractiveness of the southern (Pacheco Pass) alternative for the HST project compared to the other alternatives. If the impacts on the GEA are fully described, it will become clear that a more northerly alternative, possibly even the summarily rejected Altamont Pass alternative, may be environmentally superior to the Pacheco Pass alternative.

Thank you for the opportunity to provide these comments.

Sincerely yours,



Karen G. Weissman, Ph.D.
Principal

Other references:

K.M. Manci, D.N. Gladwin, R. Vilella, and M.G. Cavendish. "Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis." U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO., Report NERC-88/29, 1988.

P. Dufour, "Effects of Noise on Wildlife and Other Animals: Review of Research Since 1971." US Environmental Protection Agency, Report 550/9-80100, July 1980.

A. M. McKechnie, D.N. Gladwin. "Aircraft Overflight Effects on Wildlife Resources." US National Park Service, NPOA Report No. 93-8, November 1993.

F. Bradley, C. Book, and A.E. Bowles. "Effects of Low-Altitude Aircraft Overflights on Domestic Turkey Poults," Report No. HSD-TR-90-034, US Air Force Systems Command, Noise and Sonic Boom Impact Technology Program, June 1990.

K.M. Manci, D.N. Gladwin, R. Vilella, and M.G. Cavendish. "Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis." U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO., Report NERC-88/29, 1988.

EXHIBIT 5

C.V. of Terry Watt

Terrell Watt, AICP
Terrell Watt Planning Consultants
1937 Filbert Street
San Francisco, CA 94123
terrywatt@att.net
office: 415-563-0543

EXPERIENCE

- 1989 - **TERRELL WATT PLANNING CONSULTANTS**
Planning consulting firm owner
- 1981-1989 **SHUTE, MIHALY & WEINBERGER**
Planning Expert/Paralegal
- 1981-1983 **MUNDIE & ASSOCIATES**
Planning Consultant to public and private clients
- 1979-1980 **EDAW, INC.**
Project Management, Planning Consultant

PROFESSIONAL MEMBERSHIPS AND BOARDS

American Institute of Certified Planners (AICP)
American Planning Association (APA)
Board Member of the Conservation Biology Institute www.consbio.org

EDUCATION

USC GRADUATE SCHOOL OF URBAN AND REGIONAL PLANNING
Masters degree in City and Regional Planning

STANFORD UNIVERSITY
Bachelor's degree in Urban Studies

Since 1989, Terrell Watt, AICP, has owned Terrell Watt Planning Consultants. Ms. Watt's firm specializes in planning and implementation efforts focused on regionally-significant projects that promote sustainable development patterns. Prior to forming her own consulting group, she was the staff planning expert with the environmental and land use law firm Shute, Mihaly & Weinberger. She is an expert in general and specific planning, open space and agricultural land conservation and environmental compliance. Her skills also include public outreach, negotiation and facilitation.

Terrell works with a wide variety of clients throughout California including conservation organizations, government agencies and foundations. Her recent projects include:

- Project Coordinator for the Los Angeles Infill Potential Methodology study, funded by an Environmental Justice Grant from Caltrans and jointly sponsored by the City of Los Angeles, County of Los Angeles and Environment Now.
- Secretary Terry Tamminen's Representative to the California Infill Study Task Force, a Subcommittee to the State's Smart Growth Task Force.
- Primary consultant to the City of Livermore on the South Livermore Wine County Specific Plan and Transfer of Development Rights Program.
- Consultant to the Institute of Local Self Government for the development of A Local Official's Guide to Funding Open Space Acquisition.
- Consultant to the Planning and Conservation League led coalition of community and environmental groups on California High Speed Rail.
- Member of Mayor Gonzales' San Jose Coyote Valley Task Force on behalf of the Silicon Valley Conservation Council.
- Founder and Project Director of the newly forming Association of Infill Builders.

SUMMARY OF RECENT PROJECTS

South Livermore Valley Wine Country General Plan Amendment, Urban Growth Boundary, Specific Plan and Transfer of Development Rights projects. Assisted the City of Livermore in developing and adopting the South Livermore Valley Wine Country plan and implementing documents. The results include one of the highest per unit/per acre agricultural and open space mitigation fees in California, limited "final" urban development forming a permanent urban growth boundary and protection of over \$5,000 acres of prime agricultural and habitat land.

Santa Clara County Parks and Recreation Department: Assisted 2M Associates to prepare the Department's Strategic Plan for parks and open space development and protection. The Strategic Plan includes proposals for renewing the Park Charter fee for open space.

Planning and Conservation League: Coordinating comments from an informal network of environmental and conservation organizations on the proposed High Speed Rail project and related environmental review document (EIR/EIS). Funding is provided by the Resources Legacy Fund Foundation.

San Francisco Public Utilities Commission/Jones and Stokes Associates: Assisting with the community outreach program and the preparation of a Habitat Conservation Plan for the Alameda Watershed.

Caltrans, City of Los Angeles, County of Los Angeles and Environment Now: Coordinator of the Los Angeles Infill Working Group, which is tasked with preparing a report on infill potential and strategies for infill projects under an Environmental Justice Grant from Caltrans.

Mid-Peninsula Regional Open Space District: Assisted in the development of a service plan, LAFCo applications and environmental documents for the District's annexation of the San Mateo Coast.

The Nature Conservancy, California: Assisting TNC to develop conservation priorities and an Oak Woodland Protection program for Tulare County.

Infill Builders Association: Assisting a number of builder organizations and non-profits to form an Association to advance infill development in California.

Institute for Local Self Government (ILSG)/Local Government Commission: Assisting in the preparation of a guide for local governments on funding mechanisms for open space protection. Funding for the report is provided by the Resources Legacy Fund Foundation and the David and Lucile Packard Foundation.

Cambria Services District and Local Coalition: Prepared a toolbox of funding mechanisms and organizational options for protecting open space.

Open Space Fee Agreements with Landowners: Transfer tax for open space on new residential/resort development in Truckee and Placer County; Mello-Roos assessment on new residential and commercial development in Fairfield; agricultural conversion fees and dedication requirements in South Livermore; land dedications in return for development on the Newport Coast; Orange County NCCP/HCP fees.

Proposition 218 Campaign in Santa Clara County: Led the Silicon Valley Conservation Council effort to pass a Proposition 218 benefit assessment fee for open space funding in Santa Clara County.

Caltrans, The Nature Conservancy and Green Info Network: Assisted the team to evaluate how best to coordinate resource conservation and transportation planning. Work products include a computer application that illustrates potential conflicts between proposed transportation projects and TNC portfolio sites and a report outlining the transportation process in California.

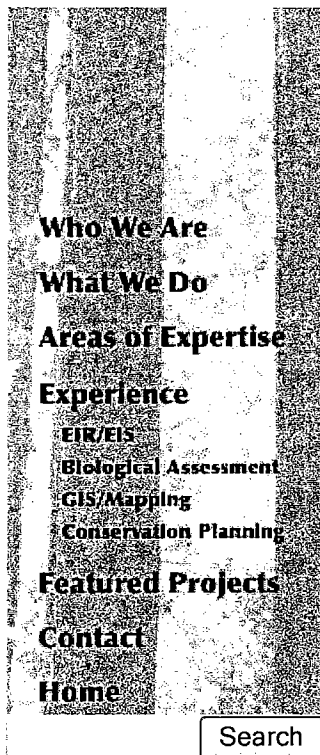
Tejon Ranch Working Group/Environment Now Foundation: Coordinator of the Working Group to determine and advance the importance of protecting high value resources on the Tejon Ranch through comprehensive planning.

Sierra Watch: Planning consultant to Sierra Watch, a non-profit directed at sensible planning for the Sierra.

Humboldt County Watershed Council. Working with the Council and five other leading environmental groups to ensure that conservation policies are included in the Humboldt County General Plan update, which is currently underway. Funded is provided by the Resources Legacy Fund Foundation.

EXHIBIT 6

C.V. of Dr. Karen Weissman



Thomas Reid Associates Environmental Consultants

Karen G. Weissman, Ph.D.
weissman@traenviro.com

Dr. Weissman has been a Principal of Thomas Reid Associates since she completed her doctorate in late 1972 and Vice-President of the firm since 1982. Her areas of expertise include ecology, population biology, demography, land use, land use economics, governmental planning and policies and regional environmental issues. Dr. Weissman provides public representation of many of her cases in the EIR process. She has provided expert witness testimony in administrative law proceedings.



Dr. Weissman plays a key role in conceptualizing, planning, contracting and executing projects. She has served as client liaison for technical information transfer and review on numerous cases, and she has expert familiarity with the methods of data collection and analysis from diverse sources, including governmental agencies, universities, public service organizations, public and private interest groups, and private industry and commerce. Dr. Weissman has primary responsibility for administering subcontracts and assuring the delivery of acceptable work products by subcontractors. Dr. Weissman also reviews work of TRA staff for CEQA adequacy and overall quality control.

Current case work includes several EIRs and the Merced County Expanded Case Study which explores the economic relationships between agriculture, wetlands, and urban growth. Past work includes the Pacifica Police Station EIR, Stonebridge Subdivision EIR, Mount Washington Cellars and Resort Village EIR, the Brisbane General Plan EIR, the Pacifica Wastewater Management Plan EIR, and the Grassland Water District Land Planning Guidance Study. Dr. Weissman was also Project Manager and Principal Investigator for the Claratina/Coffee and North Beyer Park Reorganization, Gilroy Hot Springs Resort, Gilton Solid Waste Transfer Station, and Outdoor Resorts Recreational Vehicle Park EIRs. She has also been Principal Investigator for numerous other TRA studies including the Farm Labor Housing Project EIR and Devers-Serrano Transmission Line EIS/EIR.

Dr. Weissman's expertise encompasses up-to-date knowledge of the requirements of CEQA and other environmental statutes, regulations, and case law as they pertain to environmental documents. She is frequently hired by private and public clients to provide detailed, formal technical review of numerous EIR's prepared by others, including industrial projects, "new towns," other mixed-use developments, high-voltage electrical transmission lines, sewage sludge disposal, and solid waste/hazardous waste transfer facilities. To date, Dr. Weissman has reviewed more than 100 environmental documents prepared by others. In year 2000 she worked for the Morgan Hill School District doing technical review and advising the District on the CEQA adequacy of an EIR prepared by another consultant on a proposed, controversial new high school.

Dr. Weissman has participated in the firm's many endangered species conservation planning studies. Prior to her lead role in the Merced County Expanded Case Study she was a Principal Investigator for the Grasslands Land Planning Guidance Study (1995), Natomas Basin Habitat Conservation Plan (1994-97), and the Southern San Joaquin Valley Habitat Preservation Study (1986-89) and was principal author of the Coachella Valley Fringe Toed Lizard Habitat Conservation Plan and EIS/EIR (1984-1985) and the Carrizo Plain Land Acquisition Study (1985). She provided expertise in theoretical ecology for the Biological Study for Endangered Species and Habitat Conservation Plan for San Bruno Mountain. In early 1999 she prepared the Mitigation Monitoring and Reporting Program (MMRP) for the Headwaters Forest HCP/Sustained Yield Plan (SYP). The MMRP is the essential link for the regulatory agencies to track the applicant's (Pacific Lumber's) compliance with the HCP.

A biologist by training, Dr. Weissman has done biological reconnaissance and impact assessment of projects ranging from oil and gas pipelines, transmission lines, marine terminals for oil and liquid natural gas, port expansion, landfill expansion and residential subdivisions. She has worked closely with wildlife agencies in the study of impacts on rare or endangered species in California and other parts of the western region.

Educational Background and Honors

A.B. Zoology, University of California, Los Angeles, *magna cum laude*, with Highest Departmental Honors, elected to Phi Beta Kappa
Ph.D. Biology, Stanford University, Stanford, CA
National Science Foundation Graduate fellowship

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EXHIBIT 7.

Don Marciochi Letter (August 30, 2004)



Grassland Water District

22759 S. Mercey Springs Road
Los Banos, CA 93635
Telephone (209) 826-5188
Fax (209) 826-4984

August 30, 2004

Mr. Thomas Enslow
Adams Broadwell Joseph & Cardozo
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

RE: Potential Impact of High-Speed Train Project on GWD Canals
and Waterways

Dear Mr. Enslow:

Pursuant to your request, I have reviewed the proposed High Speed Train project for its potential impact on the canals and waterways of the Grassland Water District (GWD).

I am the General Manager of the Grassland Water District and have been the General Manager for approximately 21 years. I have personal knowledge and professional experience concerning the canals and waterways of this area and concerning the maintenance and protection of the wetlands for wildlife habitat.

It is my understanding that the High Speed Train project proposes an alignment over Pacheco Pass that would run just north of and parallel to Henry Miller Avenue as it passes through the Grassland Water District. This route would cut across the southern part of the Los Banos Wildlife Management Area, the oldest WMA in the state (1929) and would sever the important wildlife corridor connecting the North and South grasslands. I am concerned that this route placement would result in significant fragmentation impacts on the wetland habitat and wildlife in this area.

This route would also bisect several important waterways essential to the management of critically important wetlands and wildlife habitat. The Santa Fe and San Luis Canals convey water to more than 31,000 acres of public and privately-owned wetlands. Mud Slough South (a natural channel) and the Porter-Blake Bypass serve as drainage facilities

for thousands of acres of additional wetlands thus making possible the timely release of water, a crucial element in the management of seasonal habitat. Rail facilities must be designed and constructed so as to not impede the flow of water in these channels as well as allow for ongoing operation and maintenance activities.

Finally, I am concerned that the placement of the High Speed Train Route may impede the access of our members to their hunting clubs. Access to these clubs should be considered prior to any final decision being made as to this route.

Thank you for the opportunity to comment on this matter.

Sincerely,



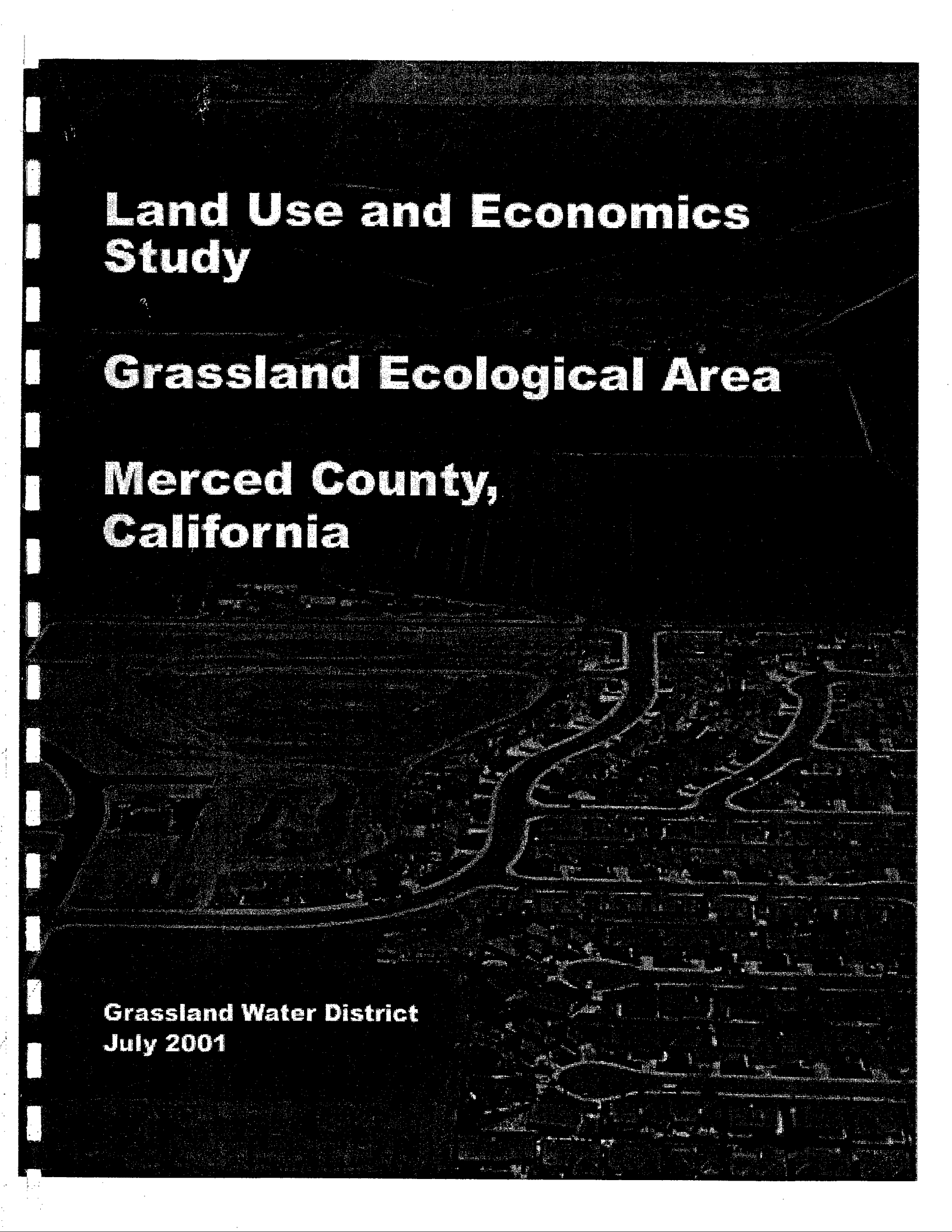
Don Marciochi

Land Use and Economics Study

Grassland Ecological Area

Merced County, California

**Grassland Water District
July 2001**



LAND USE AND ECONOMICS
STUDY

GRASSLAND ECOLOGICAL
AREA
MERCED COUNTY,
CALIFORNIA

Report prepared for:

Grassland Water District
22759 Mercey Springs Road
Los Banos, CA 93635
(209) 826-5188
e-mail: Grasslandwetlands.com

Report prepared by:

Karen G. Weissman, Ph.D., Principal
e-mail: Weissman@Traenviro.com

Thomas Reid Associates
560 Waverley Street, Suite 201
Palo Alto, CA 94301
(650) 327-0429 (www.traenviro.com)

David Strong (Economics Supporting Study)
e-mail: thestrongs@pacbell.net

Strong Associates
240 41st Street
Oakland, CA 94611
(510) 428-2904

ACKNOWLEDGEMENT

Thomas Reid Associates and Strong Associates are grateful to the three entities who jointly provided funding for the study: The Grassland Water District, Great Valley Center and the Packard Foundation. Without their commitment to the level of support needed, this comprehensive a study would not have been possible.

LAND USE AND ECONOMICS STUDY GRASSLAND ECOLOGICAL AREA/ MERCED COUNTY, CALIFORNIA

Economics of Merced County Wetlands and the Impact of Urban Growth

SUMMARY

Wetlands and wildlife habitat have more economic value than most people realize. These lands contribute to the local and regional economy through direct expenditures by public and private entities for habitat management and enhancement and by the money spent for recreation of all types in the resource areas. These areas are worthy of protection for more than just their ecological values. Protection from encroachment of non-compatible uses is most important when the wetlands are embedded in a rapidly growing region such as the Central Valley of California.

This Land Use and Economics Study, jointly funded by the Grassland Water District, the Packard Foundation and the Great Valley Center, may be the first of its kind to provide a comprehensive picture of the economic values of wetlands in the County, and their impact on the local economy. These non-urban land uses produce a net economic benefit to the local economy whereas urban development, particularly sprawl type residential development, produces a net economic loss to local government. The reason is that it costs local government more to provide public infrastructure (water supply, sewer, roads, storm drains, schools) and services (police, fire, mosquito abatement, other local services) than the revenue a city and/or county receive from the residential development. Wildlife habitat and agriculture contribute to the local economy but require very little in the way of urban services.

The wildlife habitat resource areas of Merced County include the Grassland Ecological Area (GEA) of about 178,000 acres which includes two federal wildlife refuges, three state wildlife areas and a large number of private duck clubs. In addition, wildlife habitat resource areas in the County include another 23,000 acres of state wildlife areas and 33,400 acres of state parks and recreation areas.

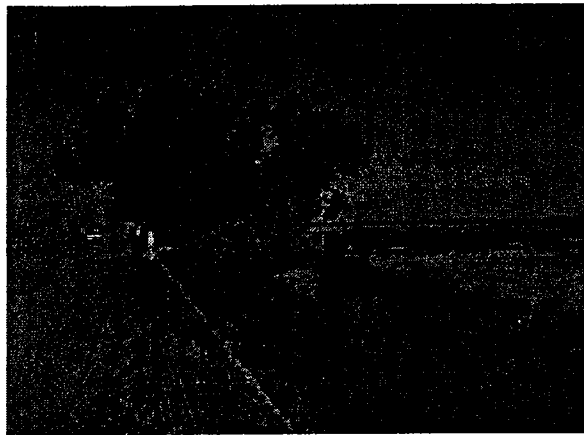
The typical total annual value of habitat maintenance and land acquisitions in the Grasslands is \$16.4 million and the value of expenditures related to recreation in the Grasslands is about \$11.4 million per year. With a multiplier of 1.41 to account for induced jobs and spending by other providing services to the wetlands users and managers, the total \$27.7 million spent on the wetlands contributes \$41 million per year to the local economy, and accounts for about 800 jobs. In Merced County as a whole, habitat management and wildlife-associated recreation contributes \$53.4 million to the county's economy and accounts for about 1100 jobs.



Waterfowl are central to private recreation in the Grasslands.

The productive economy of the wetlands is threatened by burgeoning population growth. There is an inevitable conflict between urban growth and protection of open space and

agricultural values. Growth introduces more roads, motor vehicles, houses, noise, urban pets, pests, vandalism, litter and the like into the pristine wetland environment. California Department of Finance projections show a growth in the total Merced County population from 198,000 to about 620,000 people by the year 2040. The number of urban acres is expected to increase from about 50,000 to as many as 94,000 to accommodate this population growth as well as the associated commercial and industrial development within the cities. The Merced Case Study looked at two growth scenarios: conventional or “sprawl” growth at a density of 5.5 persons per acre (2.2 dwelling units (DU) per gross acre)¹ and a more compact scenario of 10.7 persons per gross acre (4.3 DU per gross acre) and 10% of the residential and job growth as infill rather than annexation of lands around cities.



Water supply is a key part of the infrastructure needed to maintain habitat value in the wetlands.

The economic impact on the wetlands of this explosive growth is difficult to predict. The amount of urban land in a two-mile band around the wetlands complex is expected to increase by a factor of 3 to 6 by 2040, depending upon whether growth is compact or conventional. Broadly, if non-compatible urban development encroaches on the wetlands so as to reduce its utilization by wildlife, then recreational usage could be expected to decline, and public funds for habitat management may be more difficult to obtain. The impact will depend on how closely this growth encroaches on the boundaries of the refuges, or whether it, as in the case of Los Banos, divides the North from the South Grasslands.

The cities of Merced, Los Banos, Gustine and Dos Palos have planning spheres of influence affecting the GEA. Growth in unincorporated areas of the county such as Volta could also adversely affect the wildlife refuge areas. Because of its size and location, Los Banos presents the greatest challenge; the city boundary and its sphere include the GEA and its two-mile band. The current Los Banos General Plan restricts growth on the eastern end of the city to protect the wetlands, and the city has the opportunity to place important lands in open space and recreation uses.

This study also addresses growth in Merced County in relation to impact on the agricultural economy. The analysis of agricultural impact of sprawl vs. compact growth follows the same methodology as the 1995 American Farmland Trust study: *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers*.

The total value of agricultural production in Merced County in 1998 was \$1.45 billion



Agriculture is generally compatible as a buffer to the wetlands.

¹ Gross acreage includes streets, public facilities, commercial and industrial land uses.

(\$2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of \$114 million (\$160 million with the economic multiplier effect). Thus the GEA accounts for 5.3% of the total agricultural production in the County.

Two tables summarize the economic impact of the various land uses and growth types in this study. Table S1 gives the economic picture today of the economic impact of land uses on local government. In Table S-1 net revenue is the *difference* between the total cost of local government to provide services and infrastructure to the various land uses and the revenue that each land use type produces. The revenue/cost ratio is total revenue *divided by* total cost. Net revenue per acre is the net revenue divided by the total number of acres of that land use category. It can be seen from Table S-1 that agriculture and wetlands have a highly positive revenue to cost ratio. That is, for example, agriculture produces \$3.42 of revenue to local government for every dollar it costs to serve agriculture. Wetlands produce \$1.70 of revenue for every dollar of cost – less than agriculture because their productivity and market value is less, but they demand very little in the way of urban services. In addition, these two land uses produce a modest net revenue per acre.

Table S-1: Economic Impact on Local Government
– Existing Revenue vs. Cost by Land Use

	Agriculture	Wetlands	Cities Only	All Urban	County
Revenue (\$1000's)	\$12,194	\$272	\$86,125	\$279,874	\$206,215
Cost (\$1000's)	\$3,562	\$160	\$84,274	\$289,442	\$208,890
Net Revenue	\$8,632	\$112	\$1,851	(\$9,568)	(\$2,675)
Revenue/Cost Ratio	3.42	1.70	1.02	0.97	0.99
Area (ac)	1,162,000	129,000	22,875	50,130	1,162,000
Population			125,232	198,522	198,522
Net Revenue per capita			\$14.78	(\$48.20)	(\$13.47)
Net Revenue per acre	\$7.43	\$0.87	\$80.92	(\$190.86)	(\$2.30)

Source: Appendix 2 Summary Table C, Tables 4E, 4F.

In contrast, all types of urban development are a “break even” proposition or are negative. Considering the cities only (city population and city-provided urban services) the revenue/cost ratio is very slightly positive. Also, within the cities only there appears to be a net revenue per acre of about \$81. However, this is misleading because the cities populations also utilize many services provided only by the County such as District Attorney, assessor, courts and judicial services, elections etc. Looking at the entire County urban population, there is already a large net deficit in the cost per acre to provide services to its urban population – the County and cities spend \$190.86 more per acre to serve their urban population than they get back in revenue. It is more expensive and inefficient to serve this far flung scattered population compared to the more concentrated population in cities.

In Table S2 net revenue per urban acre is the net revenue divided by the total number of acres that are urban under each scenario. When one now considers the effect of the two growth scenarios on local government economics, Table S2 depicts the following: at present there is a small net deficit to local governments (cities and County together) to provide infrastructure and urban services to the urban population. This impact is negative (a deficit) whether one considers the cost per capita (population) or the cost per urban acre.

Table S2: Economic Impact on Local Government
– Effect of Growth to 2040 on Revenue vs. Cost

	Existing	2040 "Sprawl"	2040 "Compact"
Revenue (\$1000's)	\$292,340	\$942,360	\$943,272
Cost (\$1000's)	\$293,164	\$1,005,015	\$943,988
Net Revenue	(\$824)	(\$62,655)	(\$716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per capita	(\$4.15)	(\$100.98)	(\$1.15)
Net Revenue per urban acre	(\$16.44)	(\$434.12)	(\$7.36)

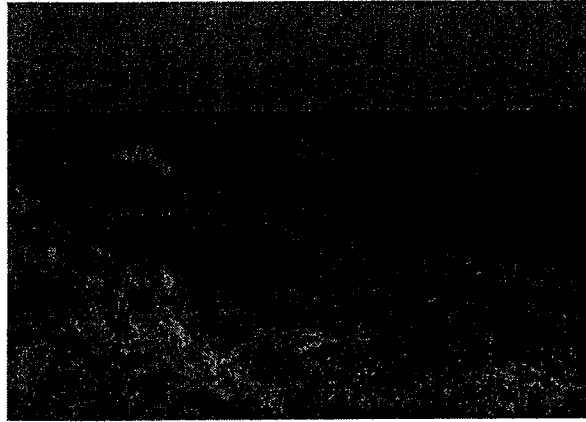
Source: Appendix 2 Summary Table D, Tables 4E, 4F.

Under the sprawl growth scenario for year 2040, the present \$16.44 deficit per acre grows to \$434.12. With the same population accommodated with compact growth, the deficit shrinks to \$7.36 per acre. The sprawl scenario shows that continued growth at the current average density per gross urbanized acre is so inefficient that unless revenues (fees and taxes) are raised substantially, local governments will fall farther behind in their ability to provide capital improvements and services.

The improvement (from -\$16.44 per acre to -\$7.36 per acre) under the compact growth scenario shows that marked effect that even a modest effort at making growth more compact would have in reducing the costs of infrastructure (e.g. roads, sewer, water, storm drainage). Even with the tripling in population under either growth scenario, serving the new population at increased compact densities is so much more efficient than serving the present population that the overall cost to serve each person or each dwelling unit (or acre) drops. Note that even under the compact scenario as depicted in this study, the net impact of the growth on local government is still negative (a net loss).

Sprawl growth would also consume twice as much land over the 44 year period. The difference in net revenue between the sprawl and compact scenarios is also related to: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and (2) the fact that this land remaining in production continues to produce revenues for the County of some \$115 million per year.

Compact growth makes more than economic sense: keeping more of the land surrounding the wetlands complex in some kind of agricultural use helps to preserve both the economic viability of agriculture in the County and its value in protecting the wetlands from the



Expenditures for water delivery and improvements are a major part of public and private investments in the wetlands.

effects of urban encroachment. Preserving wetlands as a land use includes guarantee of an adequate supply of inexpensive water of sufficient quality, protection of a one to two mile buffer around the “core” area with only compatible uses (agriculture, open space uses), more land in permanent protection in easement or fee, and continuation of seasonal land use diversification. Protection would also be enhanced by a greater level of public expenditure for wetlands, including in lieu fees paid to local governments for their loss of property taxes. Private landowners could also make greater use of other federal sources of money such as the USDA Wetland Reserve and Conservation Reserve Program or endangered species funds.

This analysis has confirmed that for Merced County, agriculture has a net positive economic impact on local government and generates over \$2 billion per year in county economic productivity. Likewise, in contrast to the common view of wetlands as an economic “wasteland” suitable only as habitat for ducks, this study shows that wetlands too have a net positive economic impact on local governments and represent important public and private investment and local economic activity.

The substantial economic values of non-urban uses emphasize the importance of their long-term protection in future land use planning decisions. This study focuses on Merced County, California, but its results are clearly applicable to most of California’s Central Valley and to other regions where the balance of urban, agricultural, and natural resource land uses is undergoing rapid change. Regional planning often considers the quality of life contribution of agricultural and natural open space; this study shows that planning also needs to provide for the integrity and long term viability of agriculture and natural resources as components of our economy.

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Merced County and Grassland Economic Study, Strong Associates

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Distribution of Land Uses in Merced County (1996) (See Also Figure 1)

<i>Land Use</i>	<i>Acres</i>
<i>Agriculture</i>	1,162,008
<i>Grassland Ecological Area (GEA)</i>	179,464*
<i>Developed area – incorporated</i>	22,875
<i>Developed area – unincorporated</i>	27,255

* Includes 49,799 acres of agriculture out of the 1,162,00

The total value of **agricultural production** in Merced County in 1998 was \$1.45 billion (\$2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of \$90.8 million (\$126 million with the economic multiplier effect). Thus the GEA accounts for 6% of the total agricultural production in the County. (See also Appendix 2, Table 2A).

About 46% (22,875 acres) of the urbanized area (50,069 acres) of Merced County is in its six cities. (See Figure 1 and Appendix 2, Table 1). The remainder is scattered throughout the rural areas around the cities, and in rural communities such as Volta and Santa Nella. There is a higher density of development near the boundaries of cities. For this study we have defined a two-mile ring or “doughnut” around each city as a way of project where a major portion of the growth in the next 40 years is likely to go. Merced, the county seat and largest city accounts for about half of the urbanized area in cities. The remaining cities, in decreasing order of size and population are: Los Banos, Atwater, Livingston, Dos Palos and Gustine. Merced, Atwater and Livingston are in the Highway 99 transportation corridor, Gustine is on the I-5 corridor and Los Banos is on S.R. 152.

B. Grassland Ecological Area (GEA)

The **Grassland Ecological Area (GEA)** is the largest wetland complex in California. The GEA boundary is a non-jurisdictional boundary established by the U.S. Fish and Wildlife Service for the purpose of designating an area in which public easements for wetland conservation were to be purchased. Its land use distribution, as shown in Appendix 2, Table 5 includes the following land uses: wetlands/rangeland -- 128,674 acres, agriculture 49,799 acres, urban development 771 acres, and other miscellaneous 220 acres. About 110,000 acres are privately owned by about 160 hunting clubs. Approximately 51,000 acres are in public ownership in federal wildlife refuge, state wildlife areas and state park (see Figure 4 and Text Tables 2 and 3 below). The area of year-round and seasonal wetlands, riparian corridors and native grasslands provides habitat for more than 550 species of plants and animals, including 47 species that have been federally listed as threatened, endangered or sensitive (GWD, 1997). Over a million waterfowl regularly are found in the GEA during the winter months. (See Figure 3). **For the purpose of this study we have termed the GEA the “focus area”, and the County as a whole the “study area”.**

1. Federal Refuges

The **San Luis National Wildlife Refuge** comprises 26,074 acres of permanent and seasonal marshes, wooded sloughs and grasslands. This refuge includes the Kesterson, Freitas, Blue Goose, West and East Bear Creek Units and the San Luis Unit (see Figure 2). Migratory waterfowl feed and rest on the seasonal marshes which are flooded in fall, winter and spring. The sloughs and channels of the San Joaquin River provide songbird and wading bird habitat, while the uplands include remnant native grasslands which are habitat for raptors.

The **Merced National Wildlife Refuge** comprises 7,034 acres of marshes, uplands and farmed fields planted with small grain and corn and pasture grasslands. Collectively, these lands provide an abundance of food for waterfowl, cranes and shorebirds..

2. State Wildlife Areas

California State wildlife areas and their acreages are listed below. (See Figure 2). State wildlife areas that are part of the GEA are shown in *italics*.

Text Table 2
State Wildlife Areas

<i>State Wildlife Area Name</i>	<i>Acreage</i>
<i>North Grasslands Wildlife Area* (WA)</i>	6,335
<i>Volta Wildlife Area</i>	3,000
<i>Los Banos WA</i>	6,130
<i>Upper and Lower Cottonwood Creek WA</i>	6,000
<i>San Luis Reservoir WA</i>	900
<i>O'Neill Forebay WA</i>	700
<i>Total acres in State Wildlife Areas</i>	23,065

* Includes Gadwall, Salt Slough and China Island wildlife areas (a small portion of the latter is in Stanislaus County)

North Grasslands Wildlife Area* - This Wildlife Area is composed of 6,335 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The area provides habitat for almost 200 species of birds and many species of mammals, reptiles, amphibians, and fish.

Volta Wildlife Area - This Wildlife Area is composed of 3,300 acres of permanent and seasonal marshes, shrublands, and grasslands. Most of the 2,800 acres of emergent marsh are open for hunting in season, bird watching and fishing. The area provides habitat for almost 150 species of birds and many species of mammals, reptiles, amphibians, and fish, including the state-threatened Giant Garter Snake.

Los Banos Wildlife Area - This Wildlife Area is composed of 6,130 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The wildlife area includes the

The 1995 *Land Planning Guidance Study* prepared for the Grassland Water District addressed both immediate, critical threats and long-term threats to habitat in the wetland ecosystems of the Grasslands Management Area. The immediate threats would be brought about through the urban expansion of the City of Los Banos, especially in the easterly direction. The longer term threats were related to the ultimate expansion of Los Banos and the other cities in Merced County that would bring urban development to within one mile or closer of the boundary of the resource conservation area.

The study addressed the concept of a buffer or band of appropriate land uses around the GEA. It examined the effect of a range of buffer widths in protecting the interior of the resource area from encroachment. The recommended actions to avoid fragmentation and impacts to the wildlife corridor area between the North and South Grasslands included:

- Restriction of land uses incompatible with habitat to an area geographically west of the Santa Fe Grade
- A minimum 200-foot wide buffer strip of agricultural land separating any waterways from the nearest road or urbanization
- An impenetrable barrier over several tens of feet close to habitat

Compact Growth Alternative

The study specifically requested the City of Los Banos to consider a compact growth alternative to its conventional General Plan. The new General Plan proposed to designate as urban a total of over 10,000 acres for urban development, of which only about 2,100 acres were actually developed in 1992. The study showed that there was enough vacant land within the existing city limit of Los Banos to accommodate 45 years of growth at historic rates and more than double the 1992 population. There was also appropriately zoned vacant land within the existing city limit sufficient to accommodate an additional 8 million square feet of commercial and industrial development.

D. 1995 American Farmland Trust (AFT) economics study

The AFT study was titled *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers*.¹ The purpose of the study was to compare the land use and economic impacts of two alternative growth scenarios for the Central Valley of California: conventional "sprawl" growth versus compact growth. The study looked at eleven counties from Kern in the south to Sacramento and Sutter in the north. The two scenarios assumed the same amount of growth would occur between 1995 and 2040 -- the study's planning horizon -- a tripling of the 1995 population. The difference was in the distribution of the growth: 3 units per acre which approximates the existing average urban density of the Valley versus 6 units to the acre, which was "intended to represent a relatively conservative, realistically achievable goal for new development in the valley". In addition, the compact scenario assumed that 10 percent of the new population would be accommodated as urban infill.

¹ David Strong of Strong Associates, who prepared the economic analysis of urban growth and its effect on agriculture and wetlands for this study, was a principal author on the 1995 AFT study.

The study defined a "Zone of Conflict" around urbanizing areas within which "urbanization can be assumed to alter agricultural investment, crop patterns and ownership, slowly changing in anticipation of further urbanization." In the zone of conflict agriculture would not have a long term future and its economic value would be diminished. The zone of conflict was defined to extend only out to one-third of a mile from the agriculture/urban boundary or interface.

The study found the following differences between the sprawl and compact growth scenarios:

Text Table 4
Results of American Farmland Trust 1995 Study

	<i>Lower Density "Sprawl"</i>		<i>Compact Growth</i>	
	<i>11 County</i>	<i>Merced Co.</i>	<i>11 County</i>	<i>Merced Co.</i>
<i>Acres of Farmland Lost</i>				
<i>Prime and Important</i>	613,669	38,858	265,937	16,090
<i>Other</i>	421,808	16,540	208,433	8,657
<i>Total</i>	1,035,477	55,398	474,370	24,747
<i>Zone of Conflict Around Urban Areas</i>				
<i>Acres</i>	2,537,490	112,610	1,585,870	92,876
<i>Dollar value of productivity lost</i>	\$2,537,490	\$112,610	\$1,575,870	\$92,876
<i>Reduction of Agricultural Sales (1993 dollars)</i>	\$5,266,000,000	\$267,000,000	\$2,448,000,000	\$145,000,000
<i>Net revenue (cost) to local government providing urban services</i>	(\$985,000,000)	(\$39,000,000)	\$217,000,000	\$18,000,000

The study showed that sprawl growth would have a far greater impact on the loss of agricultural lands and productivity. In addition, the study showed that in each of the eleven counties, sprawl growth would cause a substantial net loss to local government in that the cost to provide urban services was far in excess of the additional revenue the growth would produce.

E. Study Methodology

1. Estimate the current economic values accruing to the wetlands of Merced County

Unlike other studies of wetland economics² this study looks only at actual expenditures related to wetlands and other public open space (state parks and recreation areas). Prior studies attributed an economic value to a whole host of other functions that wetlands have that are not usually expressed in direct economic terms – for example, toxics filtration, flood protection, erosion and sediment control, endangered species habitat and people's willingness to pay to preserve wildlife habitat. In terms of assessing the overall scope of the values wetlands have, these are valid methods of valuing wetlands. The values attributed to wetlands in these studies are mostly "avoided" costs – that is, the cost of removing pollutants from water in an industrial water treatment plant, the cost of building a flood control dam, or the costs of repairing flood damage, the cost of dredging shipping channels clogged with silt etc. (See Allen et al. (1992), Loomis et al. (1990)).

The avoided cost methodology has merit if one wants to assign a comprehensive or "global" value to wetlands. However, the key point is that if costs, such as federal government expenditures are avoided somewhere, such as in Merced County, then the funds they represent may be available to be spent elsewhere, for example to build a flood control dam in another state, and not in Merced County. The avoided costs are not likely to show up directly stimulating the economy of Merced County. Therefore, in this study we purposely limit the values attributable to wetlands to *actual expenditures* "on the books" that show up in for example, the California Department of Fish and Game budget or the State Board of Equalization records for sales taxes. We are trying to encompass **all actual expenditures** on wetlands, as listed below. The total thus represents a *lower limit* on the value of wetlands, without considering any avoided costs. This methodology also provides a baseline comparable to other traditional economic analyses.

This case study looks at economic activity for agriculture and wetlands which can be traced to real budgets of agencies or the private sector. Economic activity for agriculture includes direct sales (agricultural product value) and jobs. Economic activity for wetlands includes two categories of expenditures: expenditures related to land, and expenditures related to recreational use. The number of jobs supported by these expenditures is estimated.

Expenditures related to land:

- infrastructure
- operation and maintenance
- consulting
- equipment mobilization
- levee repair
- canal cleaning
- water control structure, pipe and pump replacement
- flooding and irrigation
- vegetation management (mowing, herbicide spraying, disking, seeding, irrigation)

² For example, Allen et al. "The Value of California Wetlands – An Analysis of their Economic Benefits", a 1992 study prepared by the Campaign to Save California Wetlands